

STUDY LINK
9.1

Multiplying Sums



1. For each expression in the top row, find one or more equivalent expressions below it. Fill in the oval next to each equivalent expression.

a. $(8 + 7) * 4$

b. $(6 * 5) + (6 * 8)$

c. $3 * (9 + 4)$

☐ $(8 * 4) + (7 * 4)$

☐ $(8 * 6) + (5 * 6)$

☐ $(9 + 4) * (3 + 4)$

☐ $4 * (7 + 8)$

☐ $6 * (5 + 8)$

☐ $9 * (3 + 4)$

☐ $(8 + 4) * 7$

☐ $(8 + 5) * 6$

☐ $(4 + 9) * 3$

☐ $(8 + 4) * (7 + 4)$

☐ $(6 + 5) * (6 + 8)$

☐ $(9 * 3) + (4 * 3)$

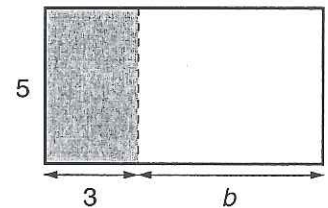
2. The area of Rectangle M is 45 square units.

a. What is the value of b ? _____

- b. Write 2 different number sentences to describe the area of the unshaded part of Rectangle M.

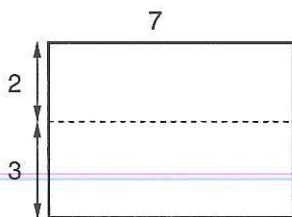
$(\text{---} - \text{---}) * \text{---} = \text{---}$ $(\text{---} * \text{---}) - (\text{---} * \text{---}) = \text{---}$

Rectangle M

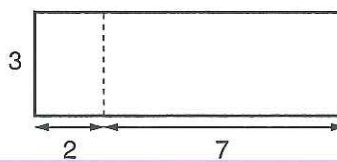


3. Each of the following expressions describes the area of one of the rectangles below. Write the letter of the rectangle next to its expression.

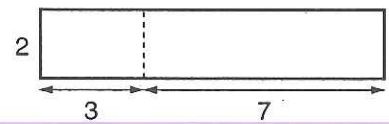
Rectangle N



Rectangle O



Rectangle P



a. $(3 + 2) * 7$ _____

b. $(2 * 3) + (7 * 3)$ _____

c. $(7 + 2) * 3$ _____

d. $(3 * 7) + (2 * 7)$ _____

e. $2 * (7 + 3)$ _____

f. $3 * (2 + 7)$ _____

4. Sandra wants to buy envelopes and stamps to send cards to 8 friends. Envelopes cost \$0.10 and stamps cost \$0.39. How much will she spend? _____

Write a number model to show how you solved the problem.

STUDY LINK
9•2

Using the Distributive Property



Reminder: $a * (x + y) = (a * x) + (a * y)$
 $a * (x - y) = (a * x) - (a * y)$

1. Use the distributive property to rewrite each expression.

a. $7 * (3 + 4) = (\underline{\hspace{1cm}} * \underline{\hspace{1cm}}) + (\underline{\hspace{1cm}} * \underline{\hspace{1cm}})$

b. $7 * (3 + \pi) = (\underline{\hspace{1cm}} * \underline{\hspace{1cm}}) + (\underline{\hspace{1cm}} * \underline{\hspace{1cm}})$

c. $7 * (3 + y) = (\underline{\hspace{1cm}} * \underline{\hspace{1cm}}) + (\underline{\hspace{1cm}} * \underline{\hspace{1cm}})$

d. $7 * (3 + (2 * 4)) = (\underline{\hspace{1cm}} * \underline{\hspace{1cm}}) + (\underline{\hspace{1cm}} * (2 * 4))$

e. $7 * (3 + (2 * \pi)) = (\underline{\hspace{1cm}} * \underline{\hspace{1cm}}) + (\underline{\hspace{1cm}} * (2 * \underline{\hspace{1cm}}))$

f. $7 * (3 + (2 * y)) = (\underline{\hspace{1cm}} * \underline{\hspace{1cm}}) + (\underline{\hspace{1cm}} * (\underline{\hspace{1cm}} * \underline{\hspace{1cm}}))$

2. Use the distributive property to solve each problem. Study the first one.

a. $7 * (110 + 25) = \underline{(7 * 110) + (7 * 25) = 770 + 175 = 945}$

b. $20 * (42 - 19) = \underline{\hspace{4cm}}$

c. $(32 + 50) * 40 = \underline{\hspace{4cm}}$

d. $(90 - 8) * 11 = \underline{\hspace{4cm}}$

e. $9 * (15 + 25) = \underline{\hspace{4cm}}$

3. Circle the statements that are examples of the distributive property.

a. $(80 * 5) + (120 * 5) = (80 + 120) * 5$ b. $6 * (3 - 0.5) = (6 * 3) - 0.5$

c. $12(d - t) = 12d - 12t$ d. $(a + c) * n = a * n + c * n$

e. $(16 + 4m) + 9.7 = 16 + (4m + 9.7)$ f. $(9 * \frac{1}{2}) - (\frac{1}{3} * \frac{1}{2}) = (9 - \frac{1}{3}) * \frac{1}{2}$

Practice

Write each quotient in lowest terms.

4. $\frac{1}{5} \div \frac{1}{15} = \underline{\hspace{2cm}}$

5. $\frac{3}{7} \div \frac{6}{11} = \underline{\hspace{2cm}}$

6. $1\frac{1}{19} \div 7\frac{1}{2} = \underline{\hspace{2cm}}$

STUDY LINK
9•3**Combining Like Terms**

Simplify each expression by rewriting it as a single term.

1. $3x + 12x =$ _____

2. $(1\frac{3}{5})y - (1\frac{3}{10})y =$ _____

3. $-(5t) - 6t =$ _____

4. $4d + (-3d) =$ _____

Complete each equation.

5. $15k = (9 - \text{_____})k$

6. $3.6p - p = \text{_____} - 0.4p$

7. $(8 + \text{_____}) * m = 5m$

8. $\text{_____}j - 4.5j = 3.8j$

Simplify each expression by combining like terms. Check your answers by substituting the given values for the variables. Show your work on the back of this sheet.

Example: $18 + 6m + 2m + 26$

Combine the m terms. $6m + 2m = 8m$

Combine the number, or constant, terms. $18 + 26 = 44$

So, $18 + 6m + 2m + 26 = 8m + 44$.

Check: Substitute 5 for m .

$$18 + (6 * 5) + (2 * 5) + 26 = (8 * 5) + 44$$

$$18 + 30 + 10 + 26 = 40 + 44$$

$$84 = 84$$

9. $8b + 9 + 4b - 3b + (-2b) - (-5) =$ _____

Check for: $b = -6$

10. $\frac{1}{2}a + \frac{3}{4}t + \frac{2}{3}a + (-\frac{1}{2}t) =$ _____

Check for: $a = 2$ and $t = -2$

Practice

11. $-117 + 64 =$ _____

12. $-9 - (-32) =$ _____

13. $-12 * (-11) =$ _____

14. $\frac{57}{-3} =$ _____

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9•4**Simplifying Expressions**

Simplify each expression by removing parentheses and combining like terms. Check by substituting the given values for the variables. Show your work.



1. $7(7 + 5f) + (f + 6)10$ _____

Check: Substitute $-\frac{1}{5}$ for f .

2. $3(4 + 5m) - 12 + (-3m)$ _____

Check: Substitute $\frac{1}{3}$ for m .

3. $(12 - 3 + 5k)6 + 4k - 2(k + 5)$ _____

Check: Substitute 0.5 for k .

4. $5(y - b) + 3b - 6y + 4(6 + b)$ _____

Check: Substitute 1 for y and $\frac{2}{3}$ for b .

Practice

Find each product or quotient.

5. $0.658 * 10^5$ _____

6. $234.8 \div 10^3$ _____

7. $5,163 * 10^{-4}$ _____

8. $7.96 \div 10^2$ _____

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Equivalent Equations



Each equation in Column 2 is equivalent to an equation in Column 1. Solve each equation in Column 1. Write *Any number* if all numbers are solutions of the equation.

Match each equation in Column 1 with an equivalent equation in Column 2. Write the letter label of the equation in Column 1 next to the equivalent equation in Column 2.

Column 1

A $4x - 2 = 6$

Solution _____

B $3s = -6$

Solution _____

C $3y - 2y = y$

Solution _____

D $5a = 7a$

Solution _____

Column 2

_____ $6j + 8 = 8 + 6j$

_____ $2c - 1 = 3$

_____ $6w = -12$

_____ $\frac{2h}{2h} = 1$

_____ $\frac{3q}{3} - 6 = -4$

A _____ $3(r + 4) = 18$

_____ $2(5x + 1) = 10x + 2$

_____ $-5x - 5(2 - x) = 2(x - 7)$

_____ $s = 0$

_____ $5b - 3 - 2b = 6b + 3$

_____ $\frac{t}{4} + 3 = 2\frac{1}{2}$

_____ $6z = 12$

_____ $2a = (4 + 7)a$

Practice

Write each product or quotient in exponential notation.

1. $2^2 * 2^3$ _____ 2. $\frac{10^4}{10^2}$ _____ 3. $5^2 * 5^2$ _____ 4. $\frac{4^3}{4^2}$ _____

STUDY LINK
9•6

Expressions and Equations



Solve.

1. $3x + 9 = 30$ $x =$ _____

2. $73 = \frac{1}{2}(108 + f)$ $f =$ _____

3. $55 = (9 - d) * 11$ $d =$ _____

4. $(m * 15) + (m * 6) = 42$ $m =$ _____

Simplify these expressions by combining like terms.

5. $8y + 27 + 6y + (-4)$ _____

6. $7b + 17 - 9b + 15$ _____

7. $3f - 80 + 25 - 10k$ _____

8. $240 + 5g + 3(10g - 5)$ _____

Circle all expressions that are equivalent to the original. There may be more than one.
 Check your answer by substituting values for the variable.

9. Original: $3r + 17 - 2r + 6$

$5r + 23$

$23 - r$

$r + 23$

$13 + r$

10. Original: $8(9 + b) - 4b$

$89 - 3b$

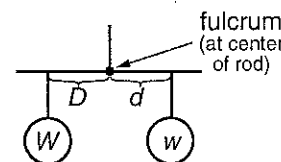
$72 - 3b$

$4b + 72$

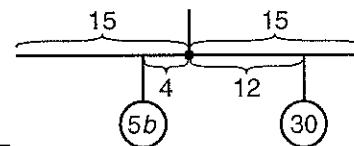
$72 - (-4b)$

Try This

11. The top mobile is in balance. The fulcrum is at the center of the rod. A mobile will balance when $W * D = w * d$.



Look at the bottom mobile. What is the weight of the object on the left?



Write and solve an equation to answer the question.

$W =$ _____ $D =$ _____ $w =$ _____ $d =$ _____

Equation _____ Solution _____

The weight of the object on the left is _____ units.

Practice

12. $8\frac{1}{3} - 2\frac{7}{8}$ _____

13. $3\frac{5}{6} * 24$ _____

14. $25 \div 4\frac{3}{8}$ _____

STUDY LINK
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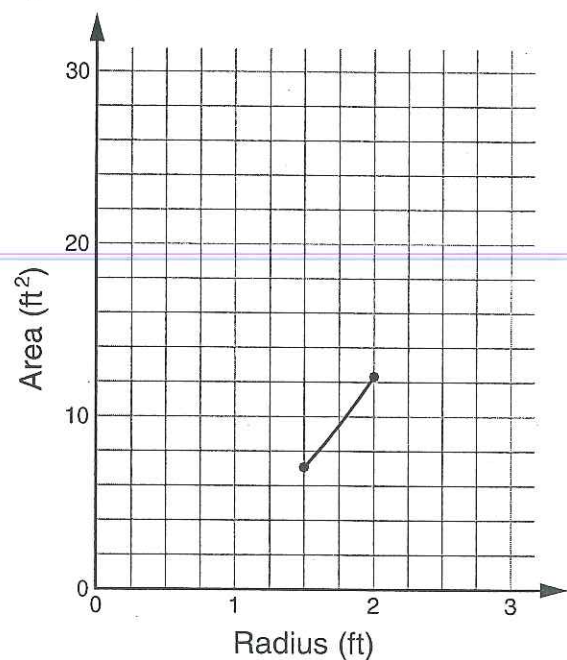
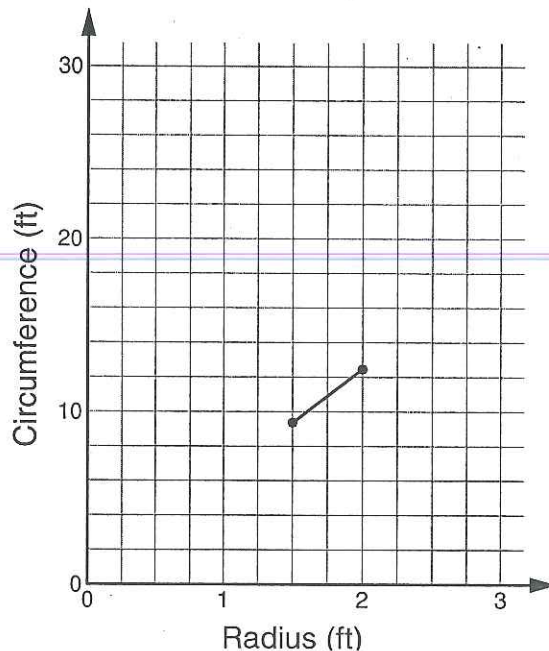
Circumferences and Areas of Circles



	A	B	C
1	circumferences and areas of circles		
2	radius (ft)	circumference (ft)	area (ft ²)
3	r	$2\pi r$	πr^2
4	0.5		
5	1.0		
6	1.5	9.4	7.1
7	2.0	12.6	12.6
8	2.5		
9	3.0		

1. Complete the spreadsheet at the left. For each radius, calculate the circumference and area of a circle having that radius. Round your answers to tenths.

2. Use the data in the spreadsheet to graph the number pairs for radius and circumference on the first grid below. Then graph the number pairs for radius and area on the second grid below. Connect the plotted points.



3. A circular tabletop has an area of 23 square feet. Use the second line graph to estimate the radius of the tabletop. Radius: About _____ (unit)

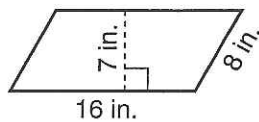
STUDY LINK
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Area Problems



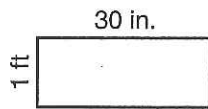
Calculate the area of each figure in Problems 1–6. Remember to include the unit in each answer.

1. parallelogram



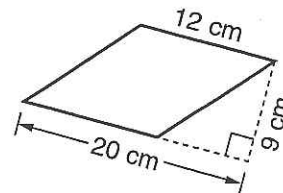
Area _____

2. rectangle



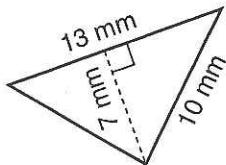
Area _____

3. parallelogram



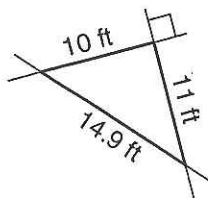
Area _____

4. triangle



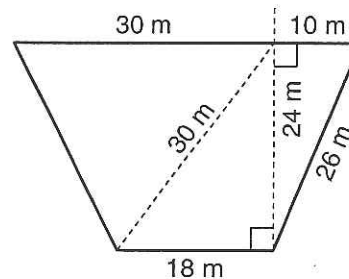
Area _____

5. triangle



Area _____

6. trapezoid

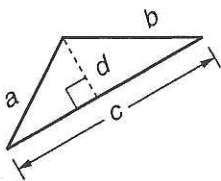


Area _____

Try This

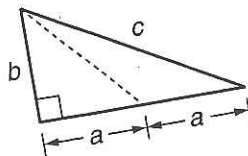
In Problems 7 and 8, all dimensions are given as variables. Write a true statement in terms of the variables to express the area of each figure.

Example:



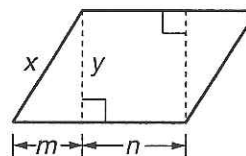
Area $\frac{1}{2} \times c \times d$

7.



Area _____

8.



Area _____

Practice

9. $x \div 5.3 = 12$ $x =$ _____

10. $-3.1 = -31w$ $w =$ _____

STUDY LINK
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Area and Volume Problems


Area formulas

Rectangle: $A = b * h$
 Parallelogram: $A = b * h$
 Triangle: $A = \frac{1}{2} * b * h$

Volume formulas

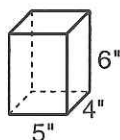
Cylinder: $V = B * h = \pi * r^2 * h$
 Rectangular prism: $V = B * h = l * w * h$
 Sphere: $V = \frac{4}{3} * \pi * r^3$

A = area
 V = volume
 B = area of base
 C = circumference
 b = length of base
 h = height
 l = length
 w = width
 r = radius

Circumference formula $C = 2\pi r$

Calculate the area or volume of each figure. Pay close attention to the units.

1.



Volume _____
 (unit)

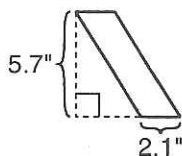
2.



diameter = 12"
 Use 3.14 for π .

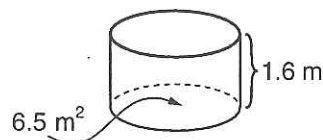
Volume _____
 (unit)

3.



Area _____
 (unit)

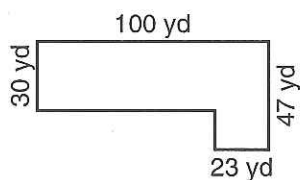
4.



Use 3.14 for π .

Volume _____
 (unit)

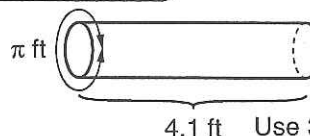
5.



Area _____
 (unit)

Try This

6.



Use 3.14 for π .

Volume _____
 (unit)

Practice

7. 0.95 m = _____ cm 8. 378 mm = _____ cm 9. 1.4 m = _____ mm

STUDY LINK
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Solving Equations by Trial and Error



Find numbers that are close to the solution of each equation.
 Use the suggested test numbers to get started.



1. Equation: $r^2 + r = 15$

r	r^2	$r^2 + r$	Compare $r^2 + r$ to 15.
3	9	12	< 15
4	16	20	> 15
3.5	12.25	15.75	> 15

My closest solution _____

2. Equation: $x^2 - 2x = 23$

x	x^2	$2x$	$x^2 - 2x$	Compare $x^2 - 2x$ to 23.
6	36	12	24	> 23
5	25	10	15	< 23
5.5	30.25	11	19.25	< 23

My closest solution _____

Practice

3. $56 - 42.52 =$ _____

4. $23.5 - 5.88 =$ _____

STUDY LINK
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Using Formulas



Each problem below states a formula and gives the values of all but one of the variables in the formula. Substitute the known values for the variables in the formula and then solve the equation.

1. The formula $C = \frac{5}{9} * (F - 32)$ may be used to convert between Fahrenheit and Celsius temperatures.

- a. Convert 77°F to degrees C.

Equation _____

Solve.

$$77^{\circ}\text{F} = \text{_____}^{\circ}\text{C}$$

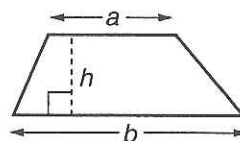
- b. Convert 50°C to degrees F.

Equation _____

Solve.

$$50^{\circ}\text{C} = \text{_____}^{\circ}\text{F}$$

2. The formula for the area of a trapezoid is $A = \frac{1}{2} * (a + b) * h$.



- a. Find the area (A) of a trapezoid if $a = 7$ cm, $b = 10$ cm, and $h = 5$ cm.

Equation _____

Solve.

Area _____
(unit)

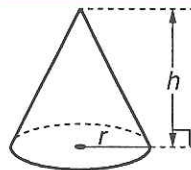
- b. Find the height (h) of a trapezoid if $a = 6.5$ inches, $b = 5.5$ inches, and $A = 90$ inches².

Equation _____

Solve.

Height _____
(unit)

3. The formula for the volume of a cone is $V = \frac{1}{3} * \pi * r^2 * h$.
Use 3.14 for π .



- a. Find the volume (V) of a cone if $r = 2$ inches and $h = 9$ inches.

Equation _____

Solve.

Volume _____
(unit)

- b. Find the height (h) of a cone if $r = 3$ cm and $V = 94.2$ cm³.

Equation _____

Solve.

Height _____
(unit)

STUDY LINK
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Pythagorean Theorem



Mentally find the positive square root of each number.

1. $\sqrt{144} = \underline{\hspace{2cm}}$

2. $\sqrt{200^2} = \underline{\hspace{2cm}}$

3. $\sqrt{900} = \underline{\hspace{2cm}}$

4. $\sqrt{0.16} = \underline{\hspace{2cm}}$

5. $\sqrt{\frac{25}{121}} = \underline{\hspace{2cm}}$

6. $\sqrt{10,000} = \underline{\hspace{2cm}}$

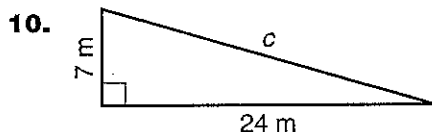
Use a calculator to find each square root. Round to the nearest hundredth.

7. $\sqrt{12} = \underline{\hspace{2cm}}$

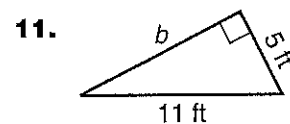
8. $\sqrt{51} = \underline{\hspace{2cm}}$

9. $\sqrt{63} = \underline{\hspace{2cm}}$

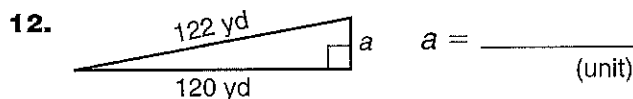
Use the Pythagorean theorem to find each missing length. Round your answer to the nearest tenth.



$c = \underline{\hspace{2cm}}$
 (unit)



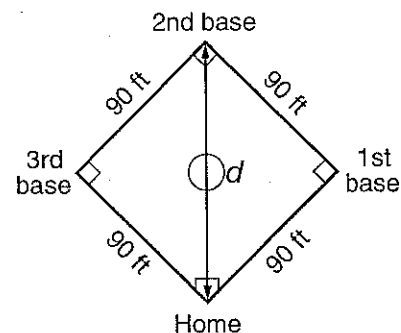
$b = \underline{\hspace{2cm}}$
 (unit)



$a = \underline{\hspace{2cm}}$
 (unit)

13. Find the distance (d) from home plate to second base.

$d = \underline{\hspace{2cm}}$ ft


Practice

Simplify.

14. $2[9(6 - 5)] = \underline{\hspace{2cm}}$

15. $5 + 3 * 4 - 8 + 2 * 7 = \underline{\hspace{2cm}}$

STUDY LINK
9•13

Unit 9 Review



1. Simplify the following expressions by combining like terms.

a. $4x + 3x =$ _____

b. $3x + 7 + x =$ _____

c. $4 * (x + 2) + 2x - 6 =$ _____

d. $(x + 3) * 2 - 2x =$ _____

2. Liani simplified the expression $8(x + 10)$ as $(8 * x) + 10$. What did she do wrong? Explain her mistake and show the correct way to solve the problem.
- _____
- _____

3. Solve each equation. Show your work on the back of this sheet.

a. $3x - 4 = 4x + 6$ _____

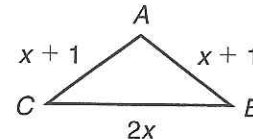
b. $5 * (2 - 6) = 4g$ _____

c. $3(2y - 3) = 15$ _____

d. $\frac{(2x - 1)}{3} = 9$ _____

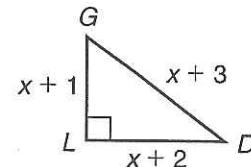
4. The perimeter of triangle ABC is 18 inches.
What is the length of each side?

AB _____ BC _____ AC _____

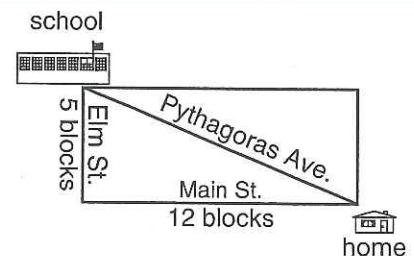


5. The perimeter of right triangle GLD is 12 centimeters.

What is the area of the triangle? _____



6. Toshi often walks to school along Main Street and Elm Street. If he were to take Pythagoras Avenue instead, how many fewer blocks would he walk? _____



Practice

7. $28 \overline{)42} =$ _____

8. $161 \div 92 =$ _____

9. $200 \overline{)120} =$ _____

